



What Phenomenal Contrast for Bodily Ownership?

ABSTRACT: *In a 1962 article, ‘On Sensations of Position’, G. E. M. Anscombe claimed that we do not feel our legs crossed; we simply know that they are that way. What about the sense of bodily ownership? Do we directly know that this body is our own, or do we know it because we feel this body that way? One may claim, for instance, that we are aware that this is our own body thanks to our bodily experiences that ascribe the property of myness to the body that they represent. Here I approach this issue from the perspective of the debate on the admissible content of perception, appealing to the method of phenomenal contrast. After rejecting the myness hypothesis, I criticize alternative accounts of the contrast in somatosensory, cognitive, and agentic terms. I conclude that the phenomenology of ownership consists in the affective awareness of the unique significance of the body for survival.*

Introduction

Look up at the ceiling while your right arm is moved to the right. Attempt to recapture the original uninterpreted experience. Try to undo the lessons of time! Now somehow one cannot shake off the belief that the arm has gone to the right. Well, try again. Hard. Attempt to transfer all attention away from the limb and onto the feelings. Scrutinise them. Now tell us about them. (O’Shaughnessy 1980: 157)

I let my index finger make an easy pendulum movement of small amplitude. I either hardly feel it, or don’t feel it at all. Perhaps a little in the tip of the finger, as a slight tension. (Not at all in the joint.) And this sensation advised me of the movement?—for I can describe the movement exactly. ‘But after all, you must feel it, otherwise you wouldn’t know (without looking) how your finger was moving’. But ‘knowing’ it only means: being able to describe it. (Wittgenstein 1968: 185)

Please obey O’Shaughnessy and Wittgenstein, focus on your body, and undo the lessons of time. What can you say about your right arm or your index finger? How do you know their locations and their movements? Brian O’Shaughnessy defends the view that our bodily knowledge is based on what we *feel*. On the other hand, Ludwig Wittgenstein, and later, Elisabeth Anscombe (1962) claim that the use of the term *feeling* is misleading. For instance, we can claim that we

have the *sensation* of being told of a fairy tale but we simply *believe* that it is like a fairy tale (Anscombe 1962: 57). Likewise, even if we claim that we feel our finger moving, Wittgenstein argues that there are no such bodily sensations and that we directly *know* that it is moving. Both O'Shaughnessy and Wittgenstein ask us to focus on relatively basic properties of the body (posture and movement), which are detected by dedicated transducers through proprioception. Now consider properties that are of a higher level, such as the sense of bodily ownership (that is, the awareness of one's body as one's own), for which there is no specific sensory receptor. Then the source of bodily knowledge appears as even more controversial. Do we directly know that this body is our own, or do we know it because we feel this body that way? One might claim, for instance, that we are aware that this is our own body thanks to our bodily experience that ascribes the property of myness to the body that it represents. However, this view has come under heavy criticism. In this article, I approach the issue of the nature of the sense of bodily ownership from the perspective of the debate on the admissible content of perception. More specifically, I appeal to Susanna Siegel's (2010) method of phenomenal contrast, which is designed to test the kind of properties that perceptual experiences can represent. Most discussions on phenomenal contrast have focused on visual awareness, but one should be able to apply the method to bodily awareness as well. Although it was originally designed to show what properties are represented in perceptual experiences, phenomenal contrast can also be used to determine the properties *that need not be* represented at the perceptual level. In particular, I argue that one does not need to appeal to the phenomenal property of myness to account for the phenomenal contrast of bodily ownership. To do so, I consider various alternative accounts: in somatosensory terms, in cognitive terms, in agentive terms, and in affective terms. I show that the first three candidates fail to provide a satisfying account of the empirical evidence but that the last one is more promising. I argue that the phenomenology of ownership consists in the affective awareness of the unique significance of the body for the self, a significance that finds its evolutionary origin in self-preservation (Vignemont 2018).

1. Myness

According to Christopher Peacocke (2014, 2017), we must distinguish among three degrees of self-representations:

- Degree 0: A creature with mental states that do not represent anything as standing in certain relations to itself. For example, a proprioceptive experience with nonconceptual content of the type [this leg is bent].
- Degree 1: A creature with mental states whose nonconceptual content represents the subject as standing in relations to other objects and events. For example, a proprioceptive experience with nonconceptual content of the type [my leg is bent].

- Degree 2: A creature with mental states that can use the conceptual first person. For example, a proprioceptive judgment with conceptual content of the type [my leg is bent].

One major question is what grounds degree 2 of self-representation. Put it another way, how do I know that this is my leg? At first sight, it might seem that the easiest way to account for the judgment that this is *my* leg that is bent (degree 2) is to appeal to a proprioceptive experience, whose nonconceptual content represents that the leg is bent and that the leg is mine (degree 1). The notion of myness, which can be defined as the property of belonging to the subject, has recently attracted increasing attention in the literature (Guillot 2017; Guillot and García-Carpintero forthcoming). Most discussions of the feeling of myness have focused on the subjective quality of conscious states (what it is like for me to be in this state) and on the sense of mental ownership (I experience this state as my own), but myness can also be used to account for the sense of bodily ownership (I experience this hand as my own). The hypothesis then is that one experiences one's body as one's own in virtue of having a feeling of myness. On this view, myness is a component not only of the conceptual content of judgments of ownership of the type [this is my body]. It is also part of the nonconceptual content of bodily experiences. Nonconceptual myness content can then provide rational ground for conceptual myness content.

The myness hypothesis, however, is not uncontroversial. A first worry concerns the origin of myness. The question is not about the transition from level 1 of self-representation to level 2, but from level 0 to level 1. As Peacocke (2017: 292) asks,

The content this leg is bent, even based on proprioception, or capacities for action with the leg, or both, is not yet the content my leg is bent . . . So the question becomes pressing: What more is required to make a nonconceptual content *c* [this leg is bent] the first-person nonconceptual content *i* [my leg is bent]?

If a theory of the sense of ownership does not go further than stating the myness hypothesis, then it partly begs the question of the first-person character of the sense of bodily ownership. The nonconceptual myness content itself requires explanation. One may propose that it simply arises from the discrimination between what happens on the body from what happens in the world but such discrimination can be performed without any self-reference. The dichotomy [body versus world] is not the same as [self versus world]. Alternatively, one may posit myness as an irreducible primitive phenomenal property but we should do so only when all the other attempts have failed.

This objection to the myness hypothesis, however, is not fatal. At most, it shows that the hypothesis is incomplete, and not that it is false. A possibly more radical criticism comes from epistemological considerations. It can be traced back to Anscombe (1957). She claims that for sensations to be able to ground knowledge, their internal content must be 'separately describable': there is a sensation of X if

its description has a different content than X and this content is taken as a sign that indicates X. For example, there is a sensation of going down in a lift because one can provide an independent description of its internal content in terms of lightness and of one's stomach lurching upward. By contrast, it is not legitimate to talk of the sensation of sitting cross-legged, Anscombe claims, because no such independent description can be given. José Luis Bermúdez (2011, 2015, 2017) has recently given a second life to Anscombe's argument in discussions of myness. He argues that sensations cannot simply duplicate the content of the judgments because one cannot justify an assertion by simply repeating it:

And yet a feeling of myness that can only be described in those very terms is not sufficiently independent of the judgment of ownership that it is claimed to justify. So the postulated non-conceptual intuitive awareness of ownership falls foul of Anscombe's dilemma. (Bermúdez 2015: 39)

Here Bermúdez conflates two distinct feelings, myness and ownership (for a similar confusion, see also Bermúdez 2011; Vignemont 2013). The feeling of ownership, I argue, is the most generic notion. It refers to a distinctive phenomenological quality that is constitutive of the sense of bodily ownership. Myness is one type of such quality, but not the only one. The feeling of ownership can thus consist in phenomenal properties other than myness, and in the end of the article, I argue that the phenomenal property constitutive of the sense of bodily ownership is the unique value of the body for the self. Still, to avoid any confusion, I avoid using the term of ownership feeling.

The problem, moreover, with Bermúdez's objection is that it endorses a strong epistemological assumption, which is both unclear and controversial. For Anscombe's argument to work, it must be that only contents that are separately describable can ground judgments. But why is it the case? And even if one accepts this premise, what is precisely a sensation that is separately describable and how to decide if it is or not (see the debate between Harcourt [2008] and McDowell [2011], for instance)? Anscombe (1962: 57) claims that 'the visual impression of a blue expanse' is separately describable and can thus ground the judgment that the sky is blue but in what sense does this qualify as an independent description? Anscombe and Bermúdez even disagree on whether there can be independent sensations of bodily posture. She denies them while he ascribes them a major role in his theory of self-awareness (Bermúdez 1998). There seem to be no clear criteria for independent content. This makes the use of Anscombe's argument in the context of bodily ownership difficult.

A third type of objection against the myness hypothesis relies on phenomenological intuitions. It rejects feelings of myness, but grants feelings of disownership, which we may characterize as *non-myness* (Chadha 2018). On this view, by default the content of bodily experiences is not self-referential: under normal circumstances, one can judge that this is one's own body but this is not in virtue of one's feeling of myness. What there can be, however, is a distinctive phenomenology of disownership. As I later detail, some patients with neurological

or psychiatric disorders report that they feel that some parts of their body do not belong to them. For instance, when asked about his hand after a right parietal lesion, a patient claimed, 'I don't know. Maybe it is mine. But no, I'm sure, it isn't mine, I don't feel it as my hand' (Cogliano et al. 2012: 764). The hypothesis here is that the patient does not lack a feeling of myness, he rather experiences an unusual feeling of his hand *not being his own*. There is an asymmetry between ownership and disownership, only the latter involving a distinctive phenomenal property. The main argument here is that the phenomenology of disownership is more vivid and salient than the phenomenology of ownership.

Surprisingly, the non-myness alternative is presented as being less controversial and more deflationary than the original myness hypothesis but it is not clear in what sense it is. In particular, if one grants that it is possible for bodily experiences to represent non-myness, then it should also be in principle possible for them to represent myness. Why, then, prefer the former (non-myness) to the latter (myness)? It is true that the phenomenology of ownership is elusive in most situations. However, we know that the brain 'prefers' novelty and that habituation leads to a decrease in brain activity. On the other hand, bodily ownership hardly counts as novelty: it is normally never altered. It can thus become almost phenomenally transparent. By contrast, disownership is big news for the brain. Worse, it is distressing news. Patients with disownership syndromes feel greatly disturbed. The phenomenological intensity of the emotional impact can be easily confused for the phenomenological intensity of disownership itself. To be fair, the comparison between ownership and disownership should be between equally affectively loaded situations. One should consider, for instance, the appropriation of prostheses and hand transplants in amputees in which ownership is a welcome novelty. The phenomenology of ownership may then possibly be as salient as the phenomenology of disownership.

So far, none of the objections against the myness hypothesis has been fatal. I shall thus turn to a new type of objection and revisit the myness hypothesis in light of recent debates on the admissible content of perceptual experiences. What properties can or cannot be perceptually represented? According to a parsimonious, or conservative, account of perception, the content of visual experiences is restricted to properties such as color, shape, and movement—what are called low-level visual properties. Likewise, one may claim that the content of bodily experiences is restricted to low-level somatosensory properties such as pressure, joint angle, and temperature. The property of myness (or non-myness) does not appear as a plausible candidate for a low-level somatosensory property. It is relatively abstract and it can be conceived as a type property, that is, the property of being a certain kind of object. If it is high-level and if one adopts a conservative assumption of perception, then it is simply impossible for bodily experiences to represent myness (or even only non-myness). No further arguments are required. It simply follows from the kind of content that perceptual experiences can have.

The conservative conception, however, has been challenged in the last ten years in favor of a richer conception of perceptual content (Bayne 2009; Siegel 2009, 2010). Furthermore, many have highlighted the specificities of bodily sensations compared

to standard perceptual experiences. Without going into all the details, one can simply note that perception normally involves identifying and being able to re-identify the perceived object whereas there is a sole object that one has access to through bodily experiences, namely one's own body (Schwenkler 2013). Furthermore, it has been argued that the spatial organization of bodily sensations departs in significant ways from the way sensory fields are organized (Martin 1992). Finally, some bodily experiences, like pain, thirst, and hunger, seem subjective and incorrigible (Aydede 2009). One may take these differences among others as evidence that bodily experiences are *not* perceptual. Without going as far as that, one may legitimately propose that bodily experiences can admit a richer content than a content that represents only low-level properties.

The method of phenomenal contrast has been precisely introduced by Siegel (2009, 2010) to determine what kind of content perceptual experiences can have. The method runs as follows. One starts with the hypothesis that visual content represents a target property, for instance causation. One then considers a pair of experiences that differ phenomenally, one of which representing the property and the other not representing it. In Siegel's example, one can contrast the experience in which one flicks a light switch and sees the light go on and the experience in which one flicks a light switch and sees the light go on but the light is at a great distance from the switch. One then determines whether the target hypothesis is the best explanation of the phenomenal contrast by ruling out alternative explanations.

I propose applying the method of phenomenal contrast to the sense of bodily ownership. I systematically compare pairs of bodily experiences, those in which one experiences one's body as one's own, and those in which one does not experience one's body as one's own. Assuming an intentionalist theory of phenomenology, if I could show that (1) the phenomenal contrast between these experiences occurs exclusively at the level of their sensory content and (2) there are no other sensory differences than the one pertaining to myness, then I would be entitled to conclude that bodily experiences represent myness. However, none of the conditions is met. This is not to say that there is no phenomenal contrast of bodily ownership. As I explain below, it makes a phenomenological difference when one is aware of one's body as one's own and when one is not. One can acknowledge the existence of a phenomenal contrast of ownership without being committed to the hypothesis that bodily experiences represent myness (Martin 1995; Bermúdez 2011, 2015, 2017; Vignemont 2018). (For exception, see Wu [forthcoming], who sometimes entertains the possibility that there is no phenomenology of ownership whatsoever.) For instance, Bermúdez (2015: 38), who has repeatedly rejected the myness hypothesis, still grants that 'ownership is phenomenologically salient. . . when we experience our bodies we experience them as our own. . . there is a phenomenology of ownership'. It does not feel the same when one is aware that this body is one's own and when one is not. However, as I show below, there is no need to appeal to the phenomenal property of myness to account for this phenomenological difference and other phenomenal properties may do a better job at it.

2. A Phenomenal Contrast of Bodily Ownership

One possible reason why most attention has focused on the admissible content of visual experiences is that it is easier to find scenarios in which one does not experience being the cause of the light turning on than it is to find scenarios in which one does not experience one's body as one's own. The contrasts that one can find for bodily ownership will be less neat and sharp than they are in the visual examples. In particular, it will be impossible to keep everything equal between the two contrasted experiences with the exception of the sense of bodily ownership and there will always be other differences. (Still, one could note that even in the visual case, the contrast is not always so clear either, and this is precisely the reason for which some people reject the method of phenomenal contrast.) To determine whether these additional differences are relevant or not, I analyze not only a unique pair of bodily experiences, but a series of them. This should help extract what might be called a phenomenal contrast of bodily ownership.

What empirical cases are relevant for our investigation of the sense of bodily ownership? In 1825, Jean-Baptiste Bouillaud described the case of a patient who said about the left side of his body that it felt 'as if it were a stranger to him; it seemed to him that somebody else's body was lying on his side, or even a corpse' (Bouillaud 1825: 64, translated in Bartolomeo, de Vito, and Malkinson 2017: 168). Since then, it has been found that patients with the neurological disorder of somatoparaphrenia or psychiatric disorders such as depersonalization and xenomelia report that they feel that some parts of their body do not belong to them. Interestingly, immediately after vestibular stimulation (stimulation of the nerve in their inner ear that provides the sense of balance), it has been found that somatoparaphrenic patients can momentarily regain a sense of ownership before losing it again.

Before vestibular stimulation

'Ex: Whose arm is this? A.R.: It's not mine Ex: Whose is it? A.R.: It's my mother . . . Ex: So where is *your* left arm? A.R.: (*Makes an indefinite gesture forwards.*) It's under there'.

Immediately after vestibular stimulation, the examiner asks the patient to show her the patient's left arm.

'A.R.: (Points to her own left arm.) Here it is. Ex: (Raises the patient's left arm.) Is this arm yours? A.R.: Why, yes'.

Two hours after vestibular stimulation A.R. is questioned again by the examiner.

'Ex: (Points to the patient's felt arm.) Whose arm is this? A.R.: It's my mother's, It's warmer. Ex: Where *is* your left arm? A.R. *stares silently at the examiner.*' (Bisiach, Rusconi, and Vallar 1991: 1030)

One can thus contrast the patient's experiences at two hour intervals. Before stimulation and two hours after, she experiences that her left arm is not her own, whereas immediately after the stimulation she experiences that her left arm is her

own. A further contrast comes from the case of a patient who has no brain lesion, but instead a peripheral lesion of his somatosensory nerves. After an acute neuropathy, Ian lost all proprioceptive and tactile information below his neck. He could still experience his body from the inside but only through pain and thermal sensations. For the first few months, he was bedridden because he had no control over his limbs, whose posture and location was inaccessible to him from the inside. At this time, Ian reported feeling alienated from his body (Gallagher and Cole 1995). With time, he regained control of his body, and he also regained his sense of bodily ownership. Again, one can contrast the patient's experience that his body was not his own (at the beginning of his disease), with his experience that his body was his own (after he regained control over his body).

The last example I consider comes not from pathological cases but from illusory ones. Participants look at a rubber hand visually presented in front of them with their own arm hidden behind a screen. The rubber and the biological hands are touched in synchrony or asynchrony. After tactile stimulation, participants are asked to what extent they agree with the statement 'I felt as if the rubber hand were my hand' (Botvinick and Cohen 1998: 756). It has been shown that they agree, but only after synchronous stroking. There are many controversies that surround the analysis of the rubber hand illusion, especially since the introspective reports are elicited by a questionnaire (Alsmith 2015; Wu forthcoming). Still, it provides an interesting contrast between the participants' experience that the rubber hand is their own hand (synchronous condition) and their experience that it is not their own (asynchronous condition).

There are many questions on how best to interpret these various subjective reports, both in healthy and pathological conditions. Introspection does not necessarily provide a direct read from phenomenal properties (Wu forthcoming). A minimal claim, however, is that these subjective reports indicate that it does not feel the same when one is aware that this body is one's own and when one is not. We may call this difference a phenomenal contrast of bodily ownership. The phenomenal contrast of ownership entails that the sense of ownership is grounded in some phenomenal properties, which can go missing. Thus, the crucial question is to determine what phenomenal properties can account for the contrast of ownership. One will be able to argue that it is the phenomenal property of myness only if one can rule out alternative explanations (see figure). Here I consider the following two main alternatives to the myness hypothesis:

- Difference in sensory phenomenology: the bodily experiences differ in their sensory content, but neither represents myness.
- No difference in sensory phenomenology: The phenomenal contrast is exclusively a difference in other types of phenomenal properties, such as cognitive, agentive and affective properties.

I assume that agentive and affective properties have their specific phenomenology, although some proponents of the liberal account of perception may conceive of them as being represented in the sensory content of perceptual experiences, and thus expressed in sensory phenomenology. This debate, however, does not affect

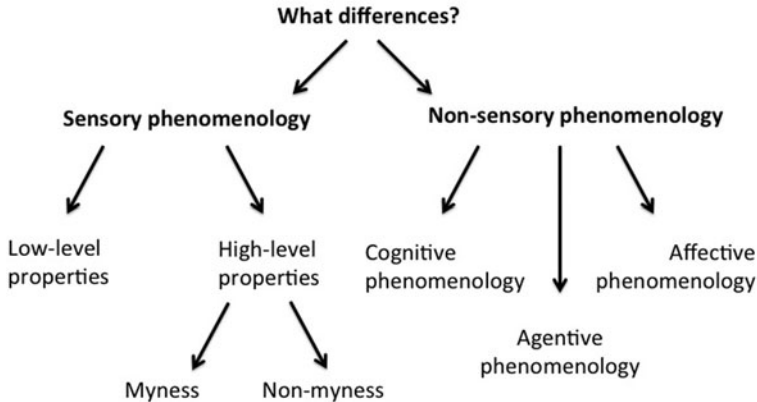


Figure What phenomenal contrast for bodily ownership?

the overall argument. Below, I briefly review each option, each one deserving a longer treatment than I could afford here, but I want to highlight the many complexities of the issue, which go far beyond a simple dichotomy between inflationary and deflationary conceptions of ownership. This, I hope, will help better organize future discussions and disagreements.

3. Somatosensory Phenomenal Differences

Let us return to the rubber hand illusion: The illusion does not affect only bodily ownership. Participants mislocalize their hand in the direction of the location of the rubber hand. In addition, they experience referred sensations in the rubber hand: they feel the stroking of the paintbrush as being located on the rubber hand instead of their own hand. These proprioceptive and tactile effects occur only after synchronous stroking when subjects report ownership. One may then argue that these proprioceptive and tactile differences exhaust the phenomenal contrast (Wu *forthcoming*). More generally, the hypothesis is that there are differences in bodily content between the two experiences but those differences can be reduced to differences in low-level somatosensory properties. A version of this view is defended by Martin (1995), who argues that the sense of ownership is not an additional quality to the sensory qualities of bodily experiences and that it is ‘somehow already inherent within them’ (Martin 1995: 278). More specifically, he claims that it consists in the spatial location of bodily sensations: ‘This sense of ownership, in being possessed by all located sensations, cannot be independent of the spatial content of the sensation, the location of the event’ (Martin 1995: 277).

According to Martin, one feels as one’s own the limb in which one feels sensations. Nothing more is required for the sense of ownership because it consists only in the spatial phenomenology of bodily experiences. Hence, although it makes a phenomenological difference when one is aware of one’s body as one’s own and when one is not, this difference is purely spatial; it is not about myness. There is nothing over and above the felt location of the sensations. Nonetheless,

Martin claims that the spatial phenomenology can account for the first-personal mark of the sense of ownership because there is an identity between one's own body and the body in which one locates bodily experiences. According to the sole-object view that he defends, for an instance of bodily experience to count as an instance of perception, it must indeed be an experience of what is in fact the subject's actual body.

This view predicts that it is impossible for one to locate sensations in a limb and not feel this limb as one's own (Martin 1995; Dokic 2003). The problem, however, is that this prediction is falsified. One can experience tactile and painful sensations and yet lack a sense of bodily ownership. For instance, depersonalized patients have preserved bodily sensations and display no sensory alteration. Yet they can report that their limbs feel as if they did not belong to them (Billon 2017). Likewise, patients with somatoparaphrenia can still feel touch in their 'alien' hand (Moro, Zampini, and Aglioti 2004; Bottini et al. 2002). A somatoparaphrenic patient, for instance, was able to detect light tactile stimuli on his 'alien' hand and even to distinguish between 'sharp' and 'dull' stimuli (Cogliano et al. 2012). Somatoparaphrenic patients can also cry out of pain if the examiner pinches their 'alien' hand (Melzack 1990). One patient asked his doctor:

P: I still have the acute pain where the prosthesis is. E: Which prosthesis?
 P: Don't you see? This thing here (indicating his left arm). The doctors have attached this tool to my body in order to help me to move . . .
 Once home could I ask my wife, from time to time, to remove this left arm and put it in the cupboard for a few hours in order to have some relief from pain?' (Maravita 2008: 102).

There is no doubt here that the patient was experiencing pain and that he was locating his pain in his left arm, and yet there is also little doubt that he was not experiencing his left arm as his own. The case of Ian the deafferented patient can also be taken as counterexample to the somatosensory account. As described earlier, he has no proprioceptive and tactile experiences but he can still feel warmth and pain. Interestingly, he described how the sensation of the warmth of his face on his hand did not suffice for him to recognize that this was his own hand:

Ian has described how he would sometimes wake to feel a hand on his face and not know to whom it belongs. Until he realised it was his own, the experience was momentarily terrifying. Since he has normal perception . . . of warmth in the hand, it is interesting that he cannot, or does not, use warmth of the hand alone to identify self from non-self. (Cole 1995: 85)

One might object that the felt location of his preserved sensations is abnormal: he has no proprioception left and thus, although he can feel warmth in his hand, he is not aware of the location of his warm hand in the external world unless he looks at it. The problem with this reply is that his body felt as alien only during the first few months following his neuropathy, but not afterwards. Somatosensory differences

could not account for the contrast between the time in which he experienced no ownership and the time in which he experienced ownership. He still missed proprioceptive and tactile sensations and he still had preserved pain and thermal sensations. Contrary to Martin's prediction, it thus appears that the sense of ownership is a positive quality over and above bodily sensations: one can report feeling sensations to be located in the hand that one disowns.

One may then try to save a low-level account of the phenomenal contrast of ownership by considering attentional factors (Kinsbourne 1995). We saw that thanks to vestibular stimulation patients can temporarily regain their sense of ownership for their hand. Interestingly, vestibular stimulation is known to manipulate space-based attention. One may then suggest that somatoparaphrenic patients simply lack the ability to pay attention to their hand. In favor of this attentional hypothesis is the frequent association between somatoparaphrenia and a related condition named personal neglect, in which patients fail to pay attention to the left side of their bodies. However, not all somatoparaphrenic patients suffer from attentional disorder (Vallar and Ronchi 2009). Furthermore, it has been shown that bodily attention does not suffice to regain the sense of bodily ownership. Instead of using vestibular stimulation, whose mechanisms are still partly mysterious, Moro et al. (2004) simply positioned the patients' neglected 'alien' left hands in their non-neglected right hemispace. They found that the patients were able to report with perfect accuracy when they were touched on their left 'alien' hand but despite paying attention to their hand and feeling that they were touched there, they still failed to feel it as being their own. Hence, there is more to the sense of bodily ownership than attention to one's body. Finally, the attentional hypothesis cannot account for the rubber hand illusion: subjects are asked to pay equal attention in both asynchronous and synchronous conditions. If anything, they pay more attention in the asynchronous condition because of the mismatch between what they see and what they feel.

I now consider whether phenomenal contrast can be explained in non-sensory terms. There are several ways to go from here. It could be in cognitive terms, agentic terms, or affective terms.

4. Cognitive Phenomenal Differences

Instead of appealing to the way one *perceives* one's body, one can appeal to the way one *thinks* about one's body in order to account for the phenomenal contrast of ownership. This view is described well by Alsmith (2015: 881): 'A cognitive account of the sense of ownership holds that one experiences something as one's own only if one thinks of something as one's own'.

The cognitive conception does not preclude the existence of a phenomenal contrast of ownership, at least if one grants the possibility of cognitive phenomenology (as in noetic feelings, for instance). To make it clear, according to the cognitive conception, one does not hold the ownership thought in virtue of feeling this body part as one's own. It is the other way around: the ownership thought gives rise to the ownership phenomenology. The phenomenal contrast of

ownership is then due to the presence of a cognitive phenomenology of ownership. But what is primary is the subject's thinking that this body is her own.

Before going into the details of the many forms that the cognitive conception can take, one may wonder whether its scope is not too broad. Alsmith describes only a unique requirement for the sense of ownership, namely that the thought that the hand is one's own is entertained, no matter whether it is 'in belief, judgement, desire, intention, recollection, or imagination' (Alsmith 2015: 884). He does not claim that it is a sufficient condition for the sense of ownership but he seems to acknowledge the possibility of experiencing ownership for a hand that one merely sees: 'To experience a hand as my own I must be in a state that involves thinking about something as my own, such as when I see a hand that I judge to be mine' (Alsmith 2015: 886).

The question is whether the cognitive conception of bodily ownership does not become detached from bodily awareness. If so, it would have an explanandum different from the rest of the theories of bodily ownership. Many indeed assume that one experiences one's body as one's own only when one feels bodily sensations, and not when one sees one's body (Brewer 1995; Martin 2015; Serrahima forthcoming; Peacocke 2017; Vignemont 2018). We can, however, add a further necessary condition for the cognitive conception and claim that one experiences something as one's own only if one thinks of something as one's own, *while perceiving it from the inside*.

Even rephrased this way, the cognitive account faces the following difficulty. The sense of ownership (or its lack) is cognitively impenetrable. Participants in the rubber hand experiment are indeed fully aware that the rubber hand is a fake hand and they rarely endorse the belief that the rubber hand is their own hand. Hence, their attitude about the rubber hand must be insensitive to the influence of their beliefs. Vice-versa: some patients know that their hand belongs to them, and yet it still seems to them *as if* it did not, as described by this patient: 'my eyes and my feelings don't agree, and I must believe my feelings. I know they look like mine, but I can *feel* they are not, and I can't believe my eyes' (Nielsen 1938: 555; my emphasis).

Cognitive impenetrability is classically taken as the signature of experiential states. For instance, in the Müller-Lyer illusion one cannot help but experience the two lines as being different despite having the belief that they are actually of the same size. Likewise, when one feels vertigo one cannot help but feel afraid of falling although one knows that there is no actual risk of falling down.

However, there are attitudes other than feelings and sensations that can be encapsulated and immune to the influence of beliefs and judgments (McDowell 2011; Mylopoulos 2015). In short, it does not seem likely that participants in the rubber hand experiment both believe (or judge) at the same time that the rubber hand is their own and that it is not, but they may entertain something weaker than beliefs, such as 'a gradable attitude of agreement towards a proposition' (Wu forthcoming). Level of agreement is precisely what is asked for in the rubber hand experiment questionnaires. The crucial question is what grounds the participants' replies. According to Wu, participants draw an inference on the basis of evidence that points to features that they would expect if the rubber hand were their own hand. The problem, however, is that there can be strong defeaters, including the

fact that they already have two hands and that there are differences in skin color, size, and laterality between the rubber hand and the real hand. Yet these defeaters do not cancel the illusion. How can participants even partly agree that this is their own hand when it does not look at all like their hand? To counterbalance the defeaters there must be strong evidence that this is their own hand and what more powerful evidence than the participants' feelings?

Proponents of the cognitive interpretation may then suggest that participants only *suppose* or *accept* that the hand is their own. As far as these attitudes are not driven by evidence, it does not matter whether there are strong defeaters. The problem now is the distress that patients express when they report that it seems as if it were not their hand. Merely supposing or accepting that this is not one's hand is not affectively disturbing precisely because one does not take what the thought represents to be true. A second problem is that cognitive attitudes that leave open whether the fact they are about is true or false, such as supposition and acceptance, are generally under voluntary control: one can voluntarily *suppose* that God exists or even *accept* it (as in Pascal's wager). However, the sense of ownership (or its lack) is not under voluntary control. Just to give a personal example, I have to avow that no matter how much I would have liked to experience the rubber hand illusion, I have always failed. More tragically, patients cannot, at will, stop feeling estranged from their bodies.

A more promising candidate may then be imagination and make-believe, which can be spontaneous and furthermore, which can be affectively loaded. Walton (1978), for instance, describes the case of Charles who shrieks and cringes in his seat while watching a horror movie. Charles is aware that this is a mere fiction work and yet he reports that he feels afraid. For Walton, Charles is only engaged in an imaginative attitude, which is decoupled from what he believes. What he experiences is only a make-believe feeling of fear. Along the same lines, Alsmith (2015) claims that in participants who experience the rubber hand illusion *imagine* that the rubber hand is their own hand. His notion of imagination is propositional: participants entertain the thought that the rubber hand belongs to them in imagination. There is, however, an alternative interpretation of Walton's example, and thus of the rubber hand illusion, in non-propositional terms: Charles simply reenacts an experience of fear, in what Currie and Ravenscroft (2002) call recreative imagination. On this experiential view, if the subjects who experience the rubber hand illusion imagine their hand to be their own, it means that they mentally recreate the feeling they have when they experience their hand as their own. Appealing to the notion of imagination thus does not resolve the debate but simply renews it within the imaginative field. Furthermore, Alsmith introduces the notion of imagination to account for the specific case of the rubber hand illusion, but we are far from Walton's example of fiction. It is true that the rubber hand looks like a theater prop, but the illusion is actually the result of normal multisensory mechanisms that have been misled. In brief, the brain normally computes the likelihood that there is a common cause between a given visual event (seeing a hand being stroked) and a tactile event (feeling the stroke). When the two sensory events are ascribed to the same spatial source, the probability is high and the two events are integrated. This is so even when a rubber hand replaces the biological hand. The perceptual system then erroneously

ascribes a common cause to the two sensory events, but the illusion involves the same type of visuo-tactile processing as when it is one's own hand that one sees. Why would it spontaneously give rise to a make-believe attitude in the rubber case, but not in normal situation?

As a last candidate for the cognitive view, I consider Gendler's (2008) notion of alief. Aliefs are developmentally and conceptually prior to any other cognitive attitudes. They correspond to innate or habitual attitudes, which result from automatic or nonconscious propensity to respond to an apparent stimulus in a particular way. They can include an affective component. The behavior they give rise to is often what one should do (norm-concordant) but not always, and it is in the norm-discordant cases that aliefs are the most salient. One may then suggest applying the alief notion to the sense of ownership. On this view, one has a sense of ownership if one has an alief that the hand is one's own. In some situations, the ownership alief is norm-concordant and in others, it is not (as in the rubber hand illusion). However, is the generalization to ownership legitimate? One example that Gendler (2008) analyzes in detail is the fact that individuals can display racial biases in behavior although they sincerely claim to be nonracist. To account for their behavior, Gendler appeals to racist aliefs. Imagine now that these individuals not only show implicit racial bias but also explicitly claim that they feel racist. Would Gendler appeal then to aliefs? Probably not. It is precisely because they do not report feeling racist that there is a need to look for a different type of attitude to account for their behavior. But participants in the rubber hand illusion do claim that they feel ownership of the rubber hand. There is no contradiction between what they explicitly acknowledge and their behavior. It is thus not clear why aliefs would be required in that case.

To recapitulate, I have reviewed a list of potential candidates of cognitive attitudes that could give some flesh to the cognitive conception of the sense of bodily ownership. However, none of them seem to be (1) cognitively impenetrable, (2) affectively loaded, and (3) beyond one's control. Below I provide a brief alternative non-sensory account of the phenomenal contrast that appeals to agentic feelings. However, this account encounters many difficulties.

5. Agentic Phenomenal Differences

Many theories appeal to the notion of action in relation to the sense of ownership, and even more to the sense of disownership (e.g., Vignemont 2007; Baier and Karnath 2008; Peacocke 2017). The fact is that disownership syndromes often involve some more or less extreme motor impairment. Most somatoparaphrenic patients are paralyzed, and those who are not suffer from the Anarchic hand sign (that is, they cannot control their limb, which seems to have a will of its own). Patients actually frequently complain about the uselessness of their 'alien' limb. The case of deafferented patients is also especially interesting. There was no somatosensory difference between time t , when Ian was no longer aware of his body as his own, and time $t + 1$, when he regained a sense of ownership. But there are agentic differences. At time t , Ian did not feel that he could control his body, that he could stand up and grasp a glass of water. He then learned to exploit visual information

to compensate for his proprioceptive loss. Looking at his limbs, he could know where they were located and planned their movements. He thus regained a sense of control. At time $t + 1$, he thus felt he could do what he wanted. The case of peripheral deafferentation can thus be used as evidence for an agentive account of the phenomenal contrast. One may then suggest the following view: one experiences something as one's own only if one feels that it is under one's direct control.

Agentive feelings are cognitively impenetrable, not under voluntary control and one can easily conceive that their loss has an affective impact. Furthermore, they have *de se* content: one experiences *oneself* as controlling the body. Yet from a deflationary point of view, the agentive conception explanation may not fare better than the myness hypothesis, and those who deny a positive phenomenology of ownership often also do the same for agency (Bermúdez 2010, 2011; Chadha 2017, 2018). Putting aside this worry, the agentive proposal appears too conservative because it cannot account for cases of individuals who feel that they cannot control their limbs and still experience them as their own. The neuropsychological literature clearly distinguishes the anarchic hand sign from the alien hand sign for this reason (Marchetti and Della Salla 1998): anarchic patients report that they have no control over their limbs but they still claim that their limbs belong to them. A similar dissociation between the sense of agency and the sense of ownership can be found in delusions of control in schizophrenia. Finally, there are many patients who have peripheral or central motor deficits (because of focal hand dystonia, apraxia, or spinal cord injury) and who still experience their limbs as their own. The agentive proposal is also too liberal if it assumes that agentive feelings are both necessary and sufficient for the sense of bodily ownership. Indeed the fact that one feels that one can move a limb does not ensure that one experiences it as one's own. This is clearly demonstrated by patients with somatoparaphrenia, who can be unaware of their paralysis (that is, anosognosia for hemiplegia): they erroneously feel that they can control their paralyzed 'alien' hand, and yet they do not experience it as their own. Patients with depersonalization also do not display any agentive disorder and still fail to feel their body to be their own.

One might then reply that the analysis is not at the right level of explanation. I have focused on agentive feelings but actually, the account should be in terms of unconscious sensorimotor knowledge. One might, for instance, argue that it is both necessary and sufficient for a body part to be incorporated in the body schema for one to experience it as one's own (Vignemont 2007). This weaker hypothesis is no more satisfactory. Consider the rubber hand illusion. It has been shown that there is no agentive contrast between synchronous and asynchronous conditions, not only at the phenomenological level (subjects report no agentive feelings toward the rubber hand, Longo et al. 2008), but also at the sensorimotor level (the way they perform their movements is not altered by the illusion, Kammers et al. 2009). Furthermore, even if there were sensorimotor differences, we would be left with no explanation of the *phenomenal* contrast. The fact is that we need differences in phenomenal properties, and if these properties are not agentive, then they must come from elsewhere.

6. Affective Phenomenal Differences

I now defend an affective account of the phenomenal contrast of ownership. To start with, compare the following two visual experiences. You wake up in the morning and you see your husband sleeping next to you. You wake up in the morning and you see a man that looks like your husband sleeping next to you but this man feels like a stranger to you. The second scenario is what happens in the Capgras syndrome, a neurological disorder that affects autonomic responses to face recognition and leads to the delusion that a spouse or a relative has been replaced by an impostor. Visual phenomenology is intact: you can accurately recognize the visual features of the face. What is impaired is affective phenomenology: the face no longer looks familiar (Ellis and Lewis 2001). The feeling of familiarity can be defined as a specific type of affective phenomenology elicited by the perception of objects and events that have personal significance. The phenomenology of visual experiences is thus dual, both sensory and affective, and the two components can be dissociated as in Capgras syndrome (Dokic and Martin 2015). I propose that the phenomenology of bodily experiences is also dual, both sensory and affective, and that the two components can be dissociated, as in somatoparaphrenia and depersonalization.

To be clear, I do not assume here that the phenomenal contrast of ownership can be explained in terms of differences in familiarity. It is true that patients often report that the ‘alien’ hand feels strange, but the scope of the feeling of familiarity is too broad: many hands feel familiar, not only one’s own. The notion of affective significance that defines familiarity results from previous encounters with the person but what we need is a different kind of affective significance, a significance that is normally specific only to one’s own body. We might call it an evolutionary significance. In brief, survival involves preservation of one’s body. This is why the brain evolved dedicated mechanism specifically tuned to the body and its immediate surrounding, which is in direct contact with the motor system in order to protect the body. In particular, it has been found that the perceptual system encodes in a specific way a spatial margin of safety around the body, also known as peripersonal space (Graziano 2018). Predators cannot approach this specific zone without eliciting in their prey specific defensive responses (flight, freeze, or fight depending on how close the predator is). Even when neutral visual stimuli approach the body, the brain anticipates the contact and generates tactile or painful expectation (Spence, Pavani, and Driver 2004).

This biologically rooted need for self-protection does not entail that one protects only one’s own body. This view is indeed clearly untenable. Like any other behavior, protective behaviors can result from complex decision-making processes, which take as inputs not only this primary affective feeling but also a variety of beliefs, desires, emotions, moral considerations, and so forth. Instead the claim is that there is no sense of ownership for body parts that are not processed as parts to protect. This seems to be empirically confirmed in somatoparaphrenia. In one study, patients saw either a Q-tip or a syringe approaching either their right hand, which they felt as their own, or their left hand, which they felt as alien (Romano et al. 2014). The experimenter then measured their arousal, indicative of their anxiety. When the

syringe approached the ‘owned’ hand, the arousal increased, as expected. But when the syringe approached the ‘alien’ hand, there was no modification. These findings are consistent with a broad pattern of attitudes. Many patients with somatoparaphrenia often try to get rid of their ‘alien’ limb, by trying to pull it out of their bed, to put it in the garbage, and so forth: ‘Yes, please take it away. I don’t care about its destiny as it is not mine’ (Gandola et al. 2012: 1176). They can also display misoplegia (dislike of one’s body) and self-inflicted injuries. As in Capgras syndrome, the sensory phenomenology is preserved, while the affective one is missing. By contrast, it has been found in the rubber hand experiment that participants who report ownership for the rubber hand display an increase of arousal when the rubber hand is under threat (synchronous condition), but they show no such reaction if they do not report ownership (asynchronous condition) (Ehrsson et al. 2007).

To recapitulate, I have argued that there is a specific affective phenomenology that goes over and above the sensory phenomenology of bodily experiences. It cannot be reduced to the sensory recognition of bodily properties, but involves autonomic responses. It expresses the unique value of the body for the self, a value that is evolutionarily rooted. It individuates the one body that matters to the subject for self-preservation more than anything else. I have further argued that differences in affective phenomenology can account for the phenomenal contrast of ownership.

The question that one might ask at this stage is how to interpret the relationship between the affective feeling and the sense of bodily ownership. Evolutionary significance is only a consequence of *the fact of bodily ownership*: this body matters because it is mine. One might then be tempted to conclude that affective phenomenology is a mere consequence of *the sense of bodily ownership*: I feel that this body matters because I am aware that it is mine. Affective phenomenology then would have no epistemic role to play. On this view, for my body to feel affectively that way presupposes that I am already aware that it is mine. The sense of bodily ownership is then prior to the affective phenomenology and thus, left with no explanation. However, I want to defend a stronger view, according to which the sense of bodily ownership *consists in* the awareness of the affective significance of the body for the self: one experiences something as one’s own only if one feels its unique personal value (for more details, see Vignemont 2018). To defend this stronger thesis, I need to show that the affective feeling can account for the first-personal character of the sense of ownership. Let us assume that a content is *de se* if it includes a property that bears some relation to the self. There are then many ways representational content can be *de se*. Myness is a type of *de se* content, which focuses on the relationship of belonging. There are other types of *de se* content, which concern other types of relationship. A classic example of *de se* content is egocentric experiences, which involve visuo-spatial relations (the tree that I see is on *my left*). Another type of relation is what may be called personal significance (things that matter *to me*, see Rønnow-Rasmussen 2011). The subject to whom the object is related is part of the truth conditions of the content. One can now see how the content of the affective feeling can be *de se* without representing myness. It is simply about a different type of relation to the self than belonging. The question now is whether the type of *de se* content that

characterizes the affective feeling can justify the transition to the other type of *de se* content that characterizes the judgment of ownership? In other words, can feelings of personal significance ground myness judgments? As said earlier, the affective feeling expresses a specific kind of personal significance. Clearly, a drawing made by my son has personal significance but what happens to the drawing does not happen to me. By contrast, what happens to the body that has this significance happens to me. Why is it so? One possibility is that it is because I am my body but there is no need to make such a strong metaphysical claim here. It is enough to assume that we evolved in a world such that for the self to survive, its body must survive. Hence, for my body to have such significance is for it to be the body to protect for the organism's evolutionary needs. Biology here provides an independent ground for the notion of significance. The impact on what happens to this body for oneself gives immediate ground for labeling it as one's own. Hence, one is entitled to judge that this is one's own body when one feels that this body matters in this special way, because under normal circumstances the body that matters in such a way is one's own body.

7. Conclusion: Back to Myness

Am I aware that this is my own hand thanks to my bodily experience that ascribes the property of myness to the hand that it represents? Here I argued that this question falls under the scope of the debate of the admissible content of perception, and I thereby applied one of its main methods: I systematically compared what one experiences when one experiences something as one's own and when one does not. If none of the alternatives had given a satisfactory account of the phenomenal contrast of ownership, we would have concluded that the content of bodily experiences represented myness. However, this was not the case. Although the contrast was not reducible to somatosensory differences, nor to cognitive or agentic differences, it can be explained by affective differences. What shall we then conclude about the myness hypothesis? The failure to rule out alternative explanations of a given phenomenal contrast does now show that a specific target property (here, myness) *cannot* be represented in sensory content. One may simply reject the method of phenomenal contrast as being inappropriate. However, the main reason for which some criticize this method is that it is not sufficient to invalidate the conservative conception of perception. It is never because it is too conservative and that it does not cover all the properties that can be represented in perceptual experiences. Alternatively, one may claim that the contrasts we analyzed were not relevant and that there may be somewhere else the right contrast. Nonetheless, I considered here not one but several contrasts and in the special case of bodily ownership, it is not as if there may be many others. What we found is that one can dispense with a feeling of myness to account for these phenomenal contrasts. Why, then, posit a phenomenal property of myness if there is actually no need for it?

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References

- Alsmith, Adrian J. T. (2015) 'Mental Activity and the Sense of Ownership'. *Review of Philosophy and Psychology*, 6, 881–96.
- Anscombe, G. E. M. (1957) *Intention*. Ithaca, NY: Cornell University Press.
- Anscombe, G. E. M. (1962) 'On Sensations of Position'. *Analysis*, 223, 55–58.
- Aydede, Murat. (ed.) (2009). 'Is Feeling Pain the Perception of Something?' *Journal of Philosophy*, 106, 531–67.
- Baier, Bernhard, and Hans-Otto Karnath. (2008) 'Tight Link between Our Sense of Limb Ownership and Self-Awareness of Actions'. *Stroke*, 39, 486–88.
- Bartolomeo, Paolo, Stefania de Vito, and Tal Seidel Malkinson. (2017) 'Space-Related Confabulations after Right Hemisphere Damage'. *Cortex*, 87, 166–73.
- Bayne, Tim. (2009) 'Perception and the Reach of Phenomenal Content'. *Philosophical Quarterly*, 59, 385–404.
- Bermúdez, José Luis. (1998) *The Paradox of Self-Consciousness*. Cambridge, MA: MIT Press.
- Bermúdez, José Luis. (2010) 'Action and Awareness of Agency: Comments on Chris Frith'. *Pragmatics and Cognition*, 18, 576–88.
- Bermúdez, José Luis. (2011) 'Bodily Awareness and Self-Consciousness'. In Shaun Gallagher (ed.), *Oxford Handbook of the Self* (Oxford: Oxford University Press), 157–179.
- Bermúdez, José Luis. (2015) 'Bodily Ownership, Bodily Awareness, and Knowledge without Observation'. *Analysis*, 75, 37–45.
- Bermúdez, José Luis. (2017) 'Ownership and the Space of the Body'. In Frédérique de Vignemont and Adrian J. T. Alsmith (eds.), *The Subject's Matter: Self-Consciousness and the Body* (Cambridge, MA: MIT Press), 117–44.
- Billon, Alexandre. (2017) 'Mineness First: Three Challenges to the Recent Theories of the Sense of Bodily Ownership'. In Frédérique de Vignemont and Adrian J. T. Alsmith (eds.), *The Subject's Matter: Self-Consciousness and the Body* (Cambridge, MA: MIT Press), 189–216.
- Bisiach, Edoardo, Maria Luisa Rusconi, and Giuseppe Vallar (1991) 'Remission of Somatoparaphrenic Delusion through Vestibular Stimulation'. *Neuropsychologia*, 29, 1029–31.
- Bottini, Gabriella, Edoardo Bisiach, Roberto Sterzi, and Giuseppe Vallar. (2002) 'Feeling Touches in Someone Else's Hand'. *Neuroreport*, 13, 249–52.
- Botwinick, Matthew, and Jonathan Cohen. (1998) 'Rubber Hands 'Feel' Touch That Eyes See'. *Nature*, 391, 756.
- Bouillaud, Jean-Baptiste. (1825) *Traité clinique et physiologique de l'encéphalite, ou inflammation du cerveau, et de ses suites* [Clinical and physiological treatment of encephalitis, or inflammation of the brain and its consequences]. Paris: Chez J.-B. Baillière.
- Brewer, Bill. (1995) 'Bodily Awareness and the Self'. In José Luis Bermúdez, Anthony Marcel, and Naomi Eilan (eds.), *The Body and the Self* (Cambridge, MA: MIT Press), 291–309.
- Chadha, Monima. (2017) 'No-Self and the Phenomenology of Agency'. *Phenomenology and the Cognitive Sciences*, 16, 187–205.
- Chadha, Monima. (2018) 'No-Self and the Phenomenology of Ownership'. *Australasian Journal of Philosophy*, 96(1), 14–27.
- Cole, Jonathan. (1995) *Pride and a Daily Marathon*. Cambridge, MA: MIT Press.
- Cogliano, Rossella, Claudio Crisci, Massimiliano Conson, Dario Grossi, and Luigi Trojano. (2012) 'Chronic Somatoparaphrenia: A Follow-Up Study on Two Clinical Cases'. *Cortex*, 486, 758–67.
- Currie, Gregory, and Ian Ravenscroft. (2002) *Recreative Minds: Imagination in Philosophy and Psychology*. Oxford: Clarendon Press.
- Dokic, Jérôme. (2003) 'The Sense of Ownership: An Analogy between Sensation and Action'. In Johannes Roessler and Naomi Eilan (eds.), *Agency and Self-Awareness: Issues in Philosophy and Psychology* (Oxford: Clarendon Press), 321–44.
- Dokic, Jérôme, and Jean-Remy Martin. (2015) "'Looks the Same but Feels Different": A Metacognitive Approach to Cognitive Penetrability'. In John Zeimbekis and Athanassios Raftopoulos (eds.), *The Cognitive Penetrability of Perception: New Philosophical Perspectives* (Oxford: Oxford University Press), 241–67.

- Ehrsson, H. Henrik, Katja Wiech, Nikolaus Weiskopf, Raymond J. Dolan, and Richard E. Passingham. (2007) 'Threatening a Rubber Hand that You Feel Is Yours Elicits a Cortical Anxiety Response'. *Proceedings of the National Academy of Sciences of the United States of America*, 104, 9828–33.
- Ellis, Hadyn D., and Michael B. Lewis. (2001) 'Capgras Delusion: A Window on Face Recognition'. *Trends in Cognitive Sciences*, 54, 149–56.
- Gallagher, Shaun, and Jonathan Cole. (1995) 'Body Schema and Body Image in a Deafferented Subject'. *Journal of Mind and Behavior*, 16, 369–89.
- Gandola, Martina, Paola Invernizzi, Anna Sedda, Elisa R. Ferrè, Roberto Sterzi, Maurizio Sberna, Eraldo Paulesu, and Gabriella Bottini. (2012) 'An Anatomical Account of Aomatoparaphrenia'. *Cortex*, 48, 1165–78.
- Guillot, Marie, and Manuel García-Carpintero, eds. (forthcoming) *The Sense of Mineness*. Oxford: Oxford University Press.
- Gendler, Tamar Szabó. (2008) 'Alien in Action (and Reaction)'. *Mind and Language*, 23, 552–85.
- Graziano, Michael S. A. (2018) *The Spaces between Us: A Story of Neuroscience, Evolution, and Human Nature*. New York: Oxford University Press.
- Guillot, Marie. (2017) 'I Me Mine: On a Confusion Concerning the Subjective Character of Experience'. *Review of Philosophy and Psychology*, 8, 23–53.
- Harcourt, Edward. (2008) 'Wittgenstein and Bodily Self-Knowledge'. *Philosophy and Phenomenological Research*, 77, 299–333.
- Kammers, Marjolein P. M., Frédérique de Vignemont, Lennart Verhagen, and H. Chris Dijkerman. (2009) 'The Rubber Hand Illusion in Action'. *Neuropsychologia*, 47, 204–11.
- Kinsbourne, Marcel. (1995) 'Awareness of One's Own Body: An Attentional Theory of Its Nature, Development, and Brain Basis'. In José Luis Bermúdez, Anthony Marcel, and Naomi Eilan (eds.), *The Body and the Self* (Cambridge, MA: MIT Press), 205–23.
- Longo, Matthew R., Friedericke Schüür, Marjolein P. M. Kammers, Manos Tsakiris, and Patrick Haggard. (2008) 'What Is Embodiment? A Psychometric Approach'. *Cognition*, 107, 978–98.
- Maravita, Angelo. (2008) 'Spatial Disorders'. In Stefano F. Cappa, Jubin Abutaleb, Jean-François Demonet, Paul C. Fletcher, and Peter Garrard (eds.), *Cognitive Neurology: A Clinical Textbook* (New York: Oxford University Press), 89–118.
- Marchetti, Clelia, and Sergio Della Salla. (1998) 'Disentangling the Alien and the Anarchic Hand'. *Cognitive Neuropsychiatry*, 3, 191–207.
- Martin, Michael G. F. (1992) 'Sight and Touch'. In Tim Crane (ed.), *The Content of Experience: Essays on Perception* (Cambridge: Cambridge University Press), 196–215.
- Martin, Martin G. F. (1995) 'Bodily Awareness: A Sense of Ownership'. In José Luis Bermúdez, Anthony Marcel, and Naomi Eilan (eds.), *The Body and the Self* (Cambridge, MA: MIT Press), 267–90.
- McDowell, John. (2011) 'Anscombe on Bodily Self-Knowledge'. In Anton Ford, Jennifer Hornsby, and Frederick Stoutland (eds.), *Essays on Anscombe's Intention* (Cambridge, MA: MIT Press), 128–46.
- Moro, Valentina, Massimiliano Zampini, and Salvatore M. Aglioti. (2004) 'Changes in Spatial Position of Hands Modify Tactile Extinction but not Disownership of Contralesional Hand in Two Right Brain-Damaged Patients'. *Neurocase*, 10, 437–43.
- Mylopoulos, Myrto I. (2015) 'Agentive Awareness Is not Sensory Awareness'. *Philosophical Studies*, 172, 761–80.
- Nielsen, James M. (1938) 'Gerstmann Syndrome: Finger Agnosia, Agraphia, Confusion of Right and Left Hand Acalculia. Comparison of this Syndrome with Disturbance of Body Scheme Resulting from Lesions of the Right Side of the Brain'. *Archives of Neurology and Psychiatry*, 39, 536–60.
- O'Shaughnessy, Brian. (1980) *The Will: A Dual Aspect Theory*. Vol. 1. Cambridge: Cambridge University Press.
- Peacocke, Christopher. (2014) *The Mirror of the World: Subjects, Consciousness, and Self-Consciousness*. Oxford: Oxford University Press.

- Peacocke, Christopher. (2017) 'Philosophical Reflections on the First Person, the Body, and Agency'. In Frédérique de Vignemont and Adrian J. T. Alsmith (eds.), *The Subject's Matter: Self-Consciousness and the Body* (Cambridge, MA: MIT Press), 289–310.
- Romano, Daniele, Martina Gandola, Gabriella Bottini, and Angelo Maravita. (2014) 'Arousal Responses to Noxious Stimuli in Somatoparaphrenia and Anosognosia: Clues to Body Awareness'. *Brain*, 137, 1213–23.
- Rønnow-Rasmussen, Toni. (2011) *Personal Value*. Oxford: Oxford University Press.
- Schwenkler, John. (2013) 'The Objects of Bodily Awareness'. *Philosophical Studies*, 162, 465–72.
- Serrahima, Carlota. (forthcoming) 'The Bounded Body'. In Marie Guillot and Manuel García-Carpintero (eds.), *The Sense of Mineness* (Oxford: Oxford University Press).
- Siegel, Susanna. (2009) 'The Visual Experience of Causation'. *Philosophical Quarterly*, 59, 519–40.
- Siegel, Susanna. (2010) *The Contents of Visual Experience*. New York: Oxford University Press.
- Spence, Charles, Francesco Pavani, and Jon Driver. (2004) 'Spatial Constraints on Visual-Tactile Cross-Modal Distractor Congruency Effects'. *Cognitive, Affective, and Behavioral Neuroscience*, 4, 148–69.
- Vallar, Giuseppe, and Roberta Ronchi. (2009) 'Somatoparaphrenia: A Body Delusion. A Review of the Neuropsychological Literature'. *Experimental Brain Research*, 1923, 533–51.
- de Vignemont, Frédérique. (2007) 'Habeas Corpus: The Sense of Ownership of One's Own Body'. *Mind and Language*, 22, 427–49.
- de Vignemont, Frédérique. (2013) 'The Mark of Bodily Ownership'. *Analysis*, 73, 643–51.
- de Vignemont, Frédérique. (2018) *Mind the Body: An Exploration of Bodily Self-Awareness*. Oxford: Oxford University Press.
- Walton, Kendall L. (1978) 'Fearing Fictions'. *Journal of Philosophy*, 75, 5–27.
- Wittgenstein, Ludwig. (1968) *Philosophical Investigations*. Translated by G. E. M. Anscombe. Oxford: Blackwell.
- Wu, Wayne. (forthcoming) 'Mineness and Introspective Data'. In Marie Guillot and Manuel García-Carpintero (eds.), *The Sense of Mineness* (Oxford: Oxford University Press).